

10/587523
SAP20 Rec'd PCT/PTO 27 JUL 2005

<110> AXXAM SRL

<120> photoproteins with enhanced bioluminescence and assays using the same

<130> 1009PCT

<160> 22

<170> PatentIn version 3.1

<210> 1

<211> 198

<212> PRT

<213> Clytia gregaria

<400> 1

Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
 180 185 190

Tyr Gly Asn Phe Val Pro
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<210> 2

<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: mutClyK1

<400> 2

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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
 35 40 45

Ala Ser Asp Asp Ile Ser Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
 65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
180 185 190

Tyr Gly Asn Phe Val Pro
195

<210> 3

<211> 198

<212> PRT

<213> Unknown

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<223> Clytin mutant: mutClyK4

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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Pro Ala Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Cys Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
 180 185 190

Tyr Gly Asn Phe Val Pro
 195

<210> 4

<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: 1F10 mutant

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Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Arg
 35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
 65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
 180 185 190

Tyr Gly Asp Phe Val Pro
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<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: 1H7 mutant

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Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
 35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Arg Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
 65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Val Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Ile Leu Asp Pro Asn Ala Asp Gly Leu
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Tyr Gly Asn Phe Val Pro
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<210> 6

<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: 1C12 mutant

<400> 6

Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
 35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
 65 70 75 80

Asp Phe Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Asn Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Leu Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Arg Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
 180 185 190

Tyr Gly Asn Phe Val Pro
 195

<210> 7

<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: 25N03b mutant

<400> 7

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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
 35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
 65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
 85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Cys Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
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Tyr Gly Asn Phe Val Pro
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<210> 8

<211> 198

<212> PRT

<213> Unknown

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<223> Clytin mutant: 3C12 mutant

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Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
35 40 45

Ala Ser Asp Asp Val Cys Ala Lys Leu Gly Ala Thr Pro Glu Gln Thr
50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
65 70 75 80

Asp Tyr Gly Lys Glu Val Glu Phe Pro Ala Phe Val Asp Gly Trp Lys
85 90 95

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
130 135 140

Ser Gly Ile Cys Arg Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
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Tyr Gly Asn Phe Val Pro
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<210> 9

<211> 198

<212> PRT

<213> Unknown

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<223> Clytin mutant: 6H22 mutant

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20 25 30

Asp Ile Asn Gly Asp Gly Lys Val Thr Leu Asp Glu Ile Val Ser Lys
35 40 45

Ala Ser Asp Asp Ile Cys Ala Arg Leu Gly Ala Thr Pro Glu Gln Thr
50 55 60

Lys Arg His Gln Asp Ala Val Glu Ala Phe Phe Lys Lys Ile Gly Met
65 70 75 80

Glu Leu Ala Asn Tyr Asp Leu Lys Leu Trp Ser Gln Asn Lys Lys Ser
 100 105 110

Leu Ile Arg Asp Trp Gly Glu Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg.
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
180 185 190

Tyr Gly Asn Phe Val Pro
195

| <210> 10

<211> 198

<212> PRT

<213> Unknown

<220>

<223> Clytin mutant: 12mutCly

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Met Ala Asp Thr Ala Ser Lys Tyr Ala Val Lys Leu Arg Pro Asn Phe
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Asp Asn Pro Lys Trp Val Asn Arg His Lys Phe Met Phe Asn Phe Leu
 20 25 30

Asp Ile Asn Gly Asp Gly Lys Ile Thr Leu Asp Glu Ile Val Ser Lys
 35 40 45

Ala Ser Asp Asp Ile Cys Ala Lys Leu Glu Ala Thr Pro Glu Gln Thr
 50 55 60

Lys Arg His Gln Val Cys Val Glu Ala Phe Phe Arg Gly Cys Gly Met
 65 70 75 80

Glu Tyr Gly Lys Glu Ile Ala Phe Pro Gln Phe Leu Asp Gly Trp Lys
 85 90 95

Gln Leu Ala Thr Ser Glu Leu Lys Trp Ala Arg Asn Glu Pro Thr
 100 105 110

Leu Ile Arg Glu Trp Gly Asp Ala Val Phe Asp Ile Phe Asp Lys Asp
 115 120 125

Gly Ser Gly Ser Ile Ser Leu Asp Glu Trp Lys Ala Tyr Gly Arg Ile
 130 135 140

Ser Gly Ile Cys Ser Ser Asp Glu Asp Ala Glu Lys Thr Phe Lys His
 145 150 155 160

Cys Asp Leu Asp Asn Ser Gly Lys Leu Asp Val Asp Glu Met Thr Arg
 165 170 175

Gln His Leu Gly Phe Trp Tyr Thr Leu Asp Pro Asn Ala Asp Gly Leu
 180 185 190

Tyr Gly Asn Phe Val Pro
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<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: mutClyK1_dna

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accctggacg	agatcgtgag	caaggccagc	gacgacatct	gcccagaagct	gggcgccacc	180
cccgagcaga	ccaagagaca	ccaggacgcc	gtggaggcct	tcttcaagaa	gatcggcatg	240
gactacggca	aggaggtgga	gttcccccgc	ttcgtggacg	gcttggaa	gctggccaac	300
taccacctga	agctgtggag	ccagaacaag	aagagcctca	tcagggactg	ggcgaggcc	360
gtgttcgaca	tcttcgacaa	ggacggcagc	ggctgcata	gcctggatga	gttggaggcc	420
tacggcagaa	tcagcggcat	ctgcagcagc	gacgaggacg	ccgaaaagac	cttcaagcac	480
tgcgacctgg	acaacagcgg	caagctggac	gtggacgaga	tgaccagaca	gcacctggac	540
ttctggtaca	ccctggaccc	caatgccgac	ggcctgtacg	gcaacttcgt	gccttgataa	600

<210> 12

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: mutClyK4_dna

<400> 12

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accctggacg	agatcgtgag	caaggccagc	gacgacatct	gcccagaagct	gggcgccacc	180
cccgagcaga	ccaagagaca	ccaggacgcc	gtggaggcct	tcttcaagaa	gatcggcatg	240
gactacggca	aggaggtgga	gttcccccgc	ttcgtggacg	gcttggaa	gctggccaac	300
tacgacctga	agctgtggag	ccagaacaag	aagagcctca	tcagggactg	ggcgaggcc	360

13

gtgttcgaca tcttcgacaa ggacggcagc ggctgcata gcctggatga gtggaaggcc 420
 tacggcagaa tcagcggcat ctgcagcagc gacgaggacg ccgaaaagac cttcaagcac 480
 tgcgacctgg acaacagcgg caagctggac gtggacgaga tgaccagaca gcacctggc 540
 ttctggtaca ccctggaccc caatgccgac ggcctgtacg gcaacttcgt gccttgataa 600

<210> 13

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 1F10 mutant_dna

<400> 13

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 tgggtgaacc ggcacaagtt catgttcaac ttccctggaca tcaacggcga cggcaagatc 120
 accctggacg agatcgtgag cagggccagc gacgacatct gcgccaaagct gggcgccacc 180
 cccgagcaga ccaagagaca ccaggacgccc gtggaggcct tcttcaagaa gatcgccatg .. 240
 gactacggca aggaggtgga gttcccccggcc ttctgtggacg gctggaagga gctggccaac 300
 tacgacctga agctgtggag ccagaacaag aagagcctca tcagggactg gggcgaggcc 360
 gtgttcgaca tcttcgacaa ggacggcagc ggcagcatca gcctggatga gtggaaggcc 420
 tacggcagaa tcagcggcat ctgcagcagc gacgaggacg ccgaaaagac cttcaagcac 480
 tgcgacctgg acaacagcgg caagctggac gtggacgaga tgaccagaca gcacctggc 540
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<210> 14

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 1H7 mutant_dna

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tgggtgaacc ggcacaagtt catgttcaat ttcctggaca tcaacggcga cggcaagatc 120
 accctggacg agatcgtgag caaggccagc gacgacatct gcgccaagct gggcgccacc 180
 cccgagcaga ccaagagaca ccgggacgccc gtggaggcct tcttcaagaa gatcggcatg 240
 gactacggca aggaggtgga gttccccgtc ttcgtggacg gctggaagga gctggccaac 300
 tacgacctga agctgtggag ccagaacaag aagagcctca tcagggactg gggcgaggcc 360
 gtgtttgaca tcttcgacaa ggacggcagc ggcagcatta gcctggatga gtggaaggcc 420
 tacggtagaa tcagcggcat ctgcagcagc gacgaggacg ccgaaaagac cttcaagcac 480
 tgcgacctgg acaacagcgg caagctggac gtggacgaga tgaccagaca gcacctggc 540
 ttctggtaca tcctggaccc caacgcccac ggcctgtacg gcaacttcgt gccttgataa 600

<210> 15

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 1C12 mutant_dna

<400> 15

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 tgggtgaacc ggcacaagtt catgttcaac ttcctggaca tcaacggcga cggcaagatc 120
 accctggacg agatcgtgag caaggccagc gacgacatct gcgccaagct gggcgccacc 180
 cccgagcaga ccaagagaca ccaggacgccc gtggaggcct tcttcaagaa gatcggcatg 240
 gacttcggca aggaggtgga gttccccgtc ttcgtggacg gctggaagga gctggccaac 300
 tacgacctga agctgtggag ccagaacaat aagagcctca tcagggactg gggcgaggcc 360
 gtgttcgaca tccttcgacaa ggacggcagc ggcagcatta gcctggatga gtggaaggcc 420
 tacggcagaa tcagcggcat ctgcagaagc gacgaggacg ccgaaaagac cttcaagcac 480
 tgcgacctgg acaacagcgg caagctggac gtggacgaga tgaccagaca gcacctggc 540
 ttctggtaca ccctggaccc caacgcccac ggcctgtacg gcaacttcgt gccttgataa 600

<210> 16

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 25N03b mutant_dna

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tgggtgaacc	ggcacaagtt	catgttcaac	ttcctggaca	tcaacggcga	cggaagatc	120
accctggacg	agatcgtgag	caaggccagc	gacgacatct	gcccggcaagct	gggcggccacc	180
cccgagcaga	ccaagagaca	ccaggacgcc	gtggaggcct	tcttcaagaa	gatcggcatg	240
gactacggca	aggaggtgga	gttccccgcc	ttcgtggacg	gctggaagga	gctggccaac	300
tacgacctga	agctgtggag	ccagaacaag	aagagcctca	tcagggactg	gggcgaggcc	360
gtgttcgaca	tcttcgacaa	ggacggcagc	ggcagcatca	gcctggatga	gtggaaggcc	420
tactgcagaa	tcagcggcat	ctgcagcagc	gacgaggacg	ccgaaaagac	cttcaagcac	480
tgcgacctgg	acaacagcgg	caagctggac	gtggacgaga	tgaccagaca	gcacctgggc	540
ttctggtaca	ccctggaccc	caacgcccac	ggcctgtacg	gcaacttcgt	gccttgataa	600

<210> 17

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 3C12 mutant_dna

<400> 17

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tgggtgaacc	ggcacaagtt	catgttcaac	ttcctggaca	tcaacggcga	cggaagatc	120
accctggacg	agatcgtgag	caaggccagc	gacgacgtct	gcccggcaagct	gggcggccacc	180
cccgagcaga	ccaagagaca	ccaggacgcc	gtggaggcct	tcttcaagaa	gatcggcatg	240
gactacggca	aggaggtgga	gttccccgcc	ttcgtggacg	gctggaagga	gctggccaac	300
tacgacctga	agctgtggag	ccaaaacaag	aagagcctca	tcagggactg	gggcgaggcc	360
gtgttcgaca	tcttcgacaa	ggacggcagc	ggcagcatca	gcctggacga	gtggaaggcc	420
tacggcagaa	tcagcggcat	ctgcagaagc	gacgaggacg	ccgaaaagac	cttcaagcac	480

tgcgacctgg acaacagcg 299 540
 caagctggac gtggacgaga tgaccagaca gcacctggc
 ttctggtaca ccctggaccc caacgcccac ggcctgtacg gcaacttcgt gccttgataa 600

<210> 18

<211> 600

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 6H22 mutant_dna

<400> 18

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 tgggtgaacc ggcacaaggat catgttcaac ttcctggaca tcaacggcga cggcaaggtc 120
 accctggacg agatcgtgag caaggccagc gacgacatct ggcgcaggct gggcgccacc 180
 cccgagcaga ccaagagaca ccaggacgccc gtggaggcct tcttcaagaa gatcggcatg 240
 gactacggca aagaggtgga gttcccccgc ttcgtggacg gctggaagga gctggccaac 300
 tacgacctga agctgtggag ccagaacaag aagagcctca tcagggactg gggcgaggcc 360
 gtgttcgaca tcttcgacaa ggacggcagc ggcagcatca gcctggatga gtggaaggcc 420
 tacggcagaa tcagcggcat ctgcagcagc gacgaggacg ccgaaaagac cttcaagcac 480
 tgcgacctgg acaacagcg 299 540
 caagctggac gtggacgaga tgaccagaca gcacctggc
 ttctggtaca ccctggaccc caacgcccac ggcctgtacg gcaacttcgt gccttgataa 600

<210> 19

<211> 597

<212> DNA

<213> Unknown

<220>

<223> Clytin mutant: 12mutCly_dna

<400> 19

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 tgggtgaacc ggcacaaggat catgttcaac ttcctggaca tcaacggcga cggcaagatc 120

accctggacg agatcgtgag caaggccagc gacgacatct gcgccaaagct ggaggccacc	180
cccgagcaga ccaagcggca ccaagtgtgc gtggaggcct tcttccgcgg ctgcggcatg	240
gagtacggca aggagatcgc cttcccccag ttcctggacg gctggaagca gctggccaca	300
agcgagctga agaagtgggc ccggaacgag cccaccctga tccgcgagtg gggcgacgcc	360
gtgttcgaca tcttcgacaa ggacggcagc ggcagcatct ctctggacga gtggaaggcc	420
tacggccgga tcagcggcat ctgcagcagc gacgaggacg ccgagaaaac cttcaagcac	480
tgcgacctgg acaacagcgg caagctggac gtggacgaga tgacccggca gcacctgggc	540
ttctggtaca ccctggaccc caacgcccac ggcctgtacg gcaacttcgt gccctga	597

<210> 20

<211> 32

<212> DNA

<213> Unknown

<220>

<223> synthetic primer

<400> 20

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<210> 21

<211> 33

<212> DNA

<213> Unknown

<220>

<223> synthetic primer

<400> 21

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<210> 22

<211> 33

<212> DNA

<213> Unknown

<220>

<223> synthetic primer

<400> 22

tcgttggat ccgcccacat ggccgacacc gcc

33

<210> 23

<211> 27

<212> DNA

<213> Unknown

<220>

<223> synthetic primer

<400> 23

ggccctcta gattatcaag gcacgaa

27

<210> 24

<211> 99

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<213> Homo sapiens

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